

Historic, Archive Document

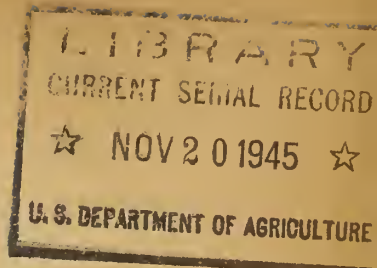
Do not assume content reflects current scientific knowledge, policies, or practices.

215
p 4

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**

AUGUST 1945



EROSION CONTROL PRACTICES DIVISION

Field Day, 1945, Floris, Iowa Hillculture Station - J. M. Aikman,
Ames, Iowa.--"Our Eighth Annual Field Day was held on Thursday, August 30,
1945. We had 1,000 in attendance and made two or three very definite improve-
ments over previous field days. As a result, we think it was the biggest and
best one we have had.

"The improvements were: 1. By enlisting the help of more of our neighbors
than usual we were able to divide the responsibilities of Field Day Host
among many individuals. More than ever before, our neighborhood had a field
day and enjoyed it immensely. 2. Practically everybody went on a conducted
tour of the farm to inspect and discuss the experiments. 3. A larger per-
centage than usual (about 80 per cent) of those present gathered on the
grassy slope in the shade to listen to the afternoon speaking program."

Stubble-Mulch and Wheat Production - C. J. Whitfield, Amarillo,
Texas.--"Wheat stubble land was tilled with the Hoeme chisel immediately
following harvest to cover shattered grain and make possible the killing
of volunteer wheat as soon as sufficient rain occurred to cause sprouting.
The chisels cover very little stubble but cannot be used in large weeds or
heavy residue because of clogging. Very few weeds and little volunteer
emerged on this land before the middle of August because of low precipita-
tion. However, a rain of 2.5 inches occurring on August 15 stimulated growth
so that tillage for weed control was necessary. Between August 24 and 31,
the stubble-mulch plots and fallow fields were tilled. Stubble-mulching
implements were used on all areas with the exception of plots set aside for
tillage with other implements. The Dempster sweep machine, which was reworked
at the Station for better stubble-mulching, gave best results both in ease
of operation and per cent of weeds killed. This machine was equipped with
rolling coulters which made possible easy operation through heavy and vined
weed growth. Weeds such as the goathead and Russian thistle caused much
trouble from plugging where the Hoeme cultivator was used. In fact, it could
be used only on the cleanest areas.

*This report is for in-Service use only and should not be used for pub-
lication without permission from the Washington Office, Soil Conserva-
tion Service Research.

**All Research work of the Soil Conservation Service is in cooperation
with the various State Experiment Stations.

Grazing Studies.-"Gains for the month of August have been lighter than gains for any previous period. Gains for the period August 1 to September 1 are as follow:

Lot number	Pasture used	Type pasture	Average daily gain*	Average weight per head, 9/1/45
1 (10 head)	I-1	Blue grama-buffalo	1.14	835
2 (10 head)	I-2(E)	Seeded mixture - cool and warm season grasses	.47	835.5
8-A (5 head)	I-5	Seeded cool and warm season grasses	1.1	767
8-B (5 head)	I-5	Seeded cool and warm season grasses	.94	750
9 (10 head)	H	Combination lake weeds - summer and winter grasses	.31	824
10 (10 head)	H	Combination lake weeds - summer and winter grasses	.63	761

*The over-all average daily gain per head for the period August 1 to September 1, 1945 was .71 pound per head.

"Continuous dry weather until the middle of August apparently caused steers to show some loss in weight on most of the pastures. Having received approximately a 2.5-inch rain over the various pastures the latter half of the month, stimulated growth of all grasses and steers probably made the most of total gain during this time. Another factor possibly retarding gains has been a heavy infestation of hornflies on the cattle since the rains. In view of the fact that cattle made low gains, their general appearance is considered excellent."

Peach Yields in Experimental Orchard - John T. Bregger, Clemson, South Carolina.-"With the completion of fruit harvest, fruit yield data have been compiled from the plot trees comprising approximately 40 different cultural treatments. Total yield for the entire orchard, including Annex (2 years younger), was 5,840 bushels. This fruit, after weighing from plot trees, was turned over to the South Carolina Experiment Station under terms of the cooperative agreement. The summarized record of plot yields is shown in the following table.

"On examination of peach tree yield data in table, it is very evident that there are large and significant differences between several soil management practices. While the yield under clean cultivation is still high, it is becoming relatively lower showing that a total elimination of soil moisture competition without the addition of humus and cover crop nitrogen is not ideal. Even applied organic mulch does not compare in effectiveness with the best cover crop and cultivation combination. The soybean-Sudan grass mixture which makes an effective summer cover crop and winter mulch cover allows fairly high yields when mowed at critical periods during the summer. Vetch continues to give the highest fruit yields, probably due to its high nitrogen content. Cover crop measurements and analyses have shown additions of nitrogen equivalent to over 500 pounds of nitrate of soda per acre. On the other hand, the winter cover crop of rye deprives the soil and trees of some of the nitrates already in the soil and where applied as fertilizer.

"Peach Tree Yield Data, 1945

Soil management practices	Average yield in bushels, 1945	Per cent increase over 1944
Clean cultivation (no cover crop).....	7.1	54
Grain straw mulch.....	8.1	100
Sorghum pomace mulch.....	4.8	33
Soybean-Sudan grass, summer c.c., winter mulch...	5.8	61
Unmowed plots.....	5.2	49
Mowed plots.....	6.3	78
Kobe lespedeza, continuous cover.....	4.8	129
Unmowed plots.....	4.2	133
Mowed plots.....	4.5	150
Lespedeza sericea, perennial cover.....	4.0	122
Unmowed plots.....	4.2	133
Mowed plots.....	3.8	111
Vetch (winter c.c.); soybeans (summer c.c.).....	7.3	50
Vetch (winter c.c.); crabgrass (summer c.c.).....	7.5	63
Rye (winter c.c.); soybeans (summer c.c.).....	6.5	86
Rye (winter c.c.); crabgrass (summer c.c.).....	5.6	55
Vetch plots; minimum cultivation*.....	5.5	20
Vetch plots; 1-1/2 months cultivation.....	7.0	46
Vetch plots; 3 months cultivation.....	9.3	86
Rye plots; minimum cultivation*.....	4.4	33
Rye plots; 1-1/2 months cultivation.....	6.0	60
Rye plots; 3 months cultivation.....	5.6	44

*Seedbed preparation only.

"The influence of early summer cultivation on fruit tree yields is becoming more and more significant as the trees become older. These differences are far greater with respect to fruit yields than they are with tree size. This is due to the fact that additional soil moisture and nitrates have a decided influence on fruit size which in turn increases the number of bushels. The highest yields were obtained on vetch plots receiving three months of early summer tillage between blossoming period and fruit harvest. In the case of rye plots, there was no significant difference between 1-1/2 and 3 months of summer tillage.

"The two cover crop practices most effective in reducing yields were the two species of lespedeza. In the case of both cover crops, mowing appeared to depress the yield slightly, a fact which can not yet be explained satisfactorily. Perhaps a greater amount of organic matter is added to the soil where mowing is not done and this is a more important factor than moisture conservation. It will be seen, however, that as peach trees become older they are less seriously affected by these continuous cover crops which a few years ago resulted in definitely smaller annual growth. Now that a larger proportion of the tree roots have gone out of reach of cover crop roots, the trees are able to more than double their fruit production over the previous year.

"Emphasis should be given to the fact that some of the most competitive soil covers which one could utilize in a peach orchard have still allowed tree yields to be high in comparison with the average commercial orchard. Even the plots producing four bushels per tree would rate well in any peach growing district of the United States, with the possible exception of those in the far west under irrigation. A four bushels per tree yield usually signifies a carload of peaches per acre which is far above the average for peach orchards of any age. On the other hand, maximum yield of over nine bushels per tree may be converted into a production of over two carloads per acre which is close to a record crop. It should be mentioned in this connection that all cover crop treatments have been conducted on terraced land where every tree row is protected from erosion and loss of runoff. Maximum yields are definitely associated with maximum tree size, showing that soil fertility definitely is the most important factor in bringing about maximum production. Proper balance between cover crops and cultivation is another important factor."

Sweet Corn Yields from Four Systems of Land Use - Oren R. Neal, New Brunswick, New Jersey.-"Sweet corn was harvested on the plots in Study 1. Yields from the four systems are shown in the following table:

"Yield of Sweet Corn from Study 1

System number	Rotation		Supplementary treatment	Number One ears per acre	Per cent increase over System 1
	Year	Crop			
1	first	Peas followed by beans	None	11,355	
	second	Tomatoes	None		
	third	Sweet corn	None		
2	first	Clover and timothy sod	None	12,060	6.2
	second	Tomatoes	None		
	third	Sweet corn	Clover and timothy seeded in fall		
3	first	Peas	Ryegrass and vetch seeded July	13,929	22.7
	second	Tomatoes	10 T/A artificial manure + rye cover crop		
	third	Sweet corn	Ryegrass and vetch cover crop		
4	first	Clover and timothy sod	None	14,563	28.3
	second	Tomatoes	10 T/A artificial manure + rye cover crop		
	third	Sweet corn	Clover and timothy seeded in fall		

"The crops used in this study had completed one cycle of the rotation before this year. The yield of Number One ears per acre in each system is an average of four plots.

Crop Yields from Eroded and Uneroded Areas.-"Samples of wheat from 13 fields, barley from 3 fields, rye from 2 fields, alfalfa hay from 8 fields, and potatoes from 6 fields on eroded and uneroded areas were collected in Monmouth and Middlesex Counties during the summer. The average yield for each crop from the two soil conditions is shown in the following table:

"Crop yields from eroded and uneroded areas

Crop	Eroded	Uneroded	Per cent less on eroded area
Wheat.....	17.0 bu./acre	30.9 bu./acre	45.0
Barley.....	27.0 bu./acre	57.3 bu./acre	52.9
Rye.....	7.5 bu./acre	22.0 bu./acre	65.9
Alfalfa....	.92 tons/acre	1.37 tons/acre	32.8
Potatoes...	153.2 - 100-lb. bags/A	173.7 - 100-lb. bags/A	11.8

Tillage Methods and Wheat Yields - Carl L. Englehorn, Fargo, North Dakota.-"At Edgeley the tillage plots were harvested during the month of August and yields calculated in terms of bushels of wheat an acre. Yield variations as between tillage method were not large; like yields were obtained from stubble mulch tillage and moldboard plowing.

"Stubble land, spring tilled, packed and seeded to wheat, yielded as follows, according to tillage method: disking, 20.7; stubble burned, no tillage, 20.4; plow, pony-press drill, 17.5; plow, 17.3; subsurface tiller, 17.3; field cultivator, 17.1; 2 tons of straw, subtilled, 16.2 bushels.

"On summer fallow, plots tilled with the plow and field cultivator during 1944 yielded 22.4 bushels of wheat; the same tillage but plots left in a pitted condition over winter, 21.4 bushels. Plots tilled with the field cultivator alone yielded 20.0 bushels and stubble mulch fallow yielded 19.9 bushels."

Tile Installation - G. M. Browning, Ames, Iowa.-"Two short tile lines were put in at the Clarinda Experimental Farm. These tiles were placed around the hillside on the horizontal to intercept water which had been coming to the surface at the border between the impermeable glacial till and the more permeable loessial soils. This condition is typical of many fields in southern and western Iowa. Past experience would indicate that this is a practical method of control for these 'seap spots.'

AAA Committeemen Visit Station.-"On August 30, 60 AAA Committeemen from Shelby County attended an all day tour at the Farm. This is the first special tour of this type that has been arranged for outside groups this year. Several of the committeemen had attended the Field Days held in July and had requested that a special tour be arranged in order that other Committeemen in the county would have an opportunity to study the work in progress."

Barley Green Manure and Corn Yields - H. O. Hill, Temple, Texas.-

"One year's results from growing barley for green manure in the furrow on bedded land gave the results of the following table:

"Corn yields from barley green manure in furrow and fertilizer experiment on Austin clay, 1945

Treatment	Yield, Bushels per acre
1. Check.....	24.2
2. Barley green manure in furrow.....	31.3
3. Barley green manure and 200 pounds $(\text{NH}_4)_2 \text{SO}_4$ per acre.....	30.4
4. Barley green manure and 400 pounds super- phosphate per acre.....	29.9
5. Barley green manure and 200 pounds $(\text{NH}_4)_2 \text{SO}_4$ and 400 pounds superphosphate per acre.....	33.4

"These data indicate that considerable response was obtained from the barley green manure. Fertilizers did not increase the yield where nitrogen and phosphorus fertilizers were applied separately, where the two were applied together slight yield increase resulted."

Calculations of Row Grades - T. L. Copley, Raleigh, North Carolina.-"Calculations of row grades from field surveys in the experimental terrace intervals were completed, and are shown below:

"Average series I and II

Interval number	Grade of lower terrace interval	Less than 0	0 to 6 inches	6 to 12 inches	12 to 18 inches	18 to 24 inches	24 to 30 inches	30 inches and over	Inches per 100 feet
1	3	4	35	33	17	9	1	1	9.1
2	6	1	17	32	24	17	7	2	12.4
3	9	1	4	30	37	20	2	7	17.2
4	12	0	4	12	41	25	8	10	18.1

"The crop rows above were laid out by the improved row system, which tends to provide continuous row drainage in the direction of the terrace flow. Note that there is a minus row grade in only a very small portion of the row sections and that with an increase in terrace grade there is also a definite increase in row grades. Grades of rows laid out parallel the base terrace are affected not only by the grade of the terrace but also by changes in land slope. Note that in most cases this change in land slope increased the average row approximately 6" per 100 feet above the grade of the base terrace. This relationship between row grade and slope changes is being studied further and in more detail."

Diversion Terrace Study Redesigned - Orville E. Hays, LaCrosse, Wisconsin.-"During the month the 'G' diversion terrace at the Station was remodeled and extended in preparation for further study regarding the use of diversion terraces in connection with contour strip cropping on land too steep to be successfully terraced. The extension increased the length from 1,350 to 1,900 feet and the drainage area from 7.85 to 11.98 acres. The length of slope above this diversion terrace is 300 to 350 feet. The maximum slope of the watershed is 20 per cent and the minimum 8 per cent, the average being 13 per cent. The watershed will be farmed in a five-year rotation of corn, grain and 3 years of hay in contour strips approximately 50 feet wide.

"The extension was designed with variable grades and cross-sectional area to provide as nearly as possible a uniform velocity of 3 feet per second in the channel. The maximum grade is 3 per cent, the minimum .4 per cent, and the cross sectional area varies from 5 square feet to 15 square feet. Studies will be made of peak flow, siltation, and approximate channel velocities. The old section of diversion terrace has been under measurement during this year - the rain of May 22 totaling 2.69 inches with a 5-minute intensity of 2.16 inches per hour and a 30-minute intensity of 1.20 inches per hour caused a peak flow of 5.35 cu.ft. per second with an approximate channel velocity of 1.0 feet per second and a roughness coefficient of .087."

Service Conference on Conservation of Bean Land - Maurice Donnelly, Riverside, California.-"The Project Supervisor presented research material to a Service conference on conservation of bean land held in Santa Barbara, California in August 1945. The group devoted several days to a discussion of bean lands and measures for their conservation. On the afternoon of August 14, the group examined the experimental fields at Somis.

"Based on findings presented to the conference, a set of proven practices was drawn up to guide a renewed vigorous effort on the conservation of bean and associated lands in the coastal section of California."

Runoff Records for the Pasture Areas - Dwight D. Smith, Columbia, Missouri.-"Runoff records for the pasture areas have been calculated to July 1. The contour furrowed bluegrass area has had the lowest total runoff for the 6-months period. For the three bluegrass areas, runoff for the total grazing area is measured while for the other three runoff is measured for 3 small plots within each grazing area.

Area	Rainfall	Size of runoff area	Inches runoff
		<u>Acres</u>	
Contour furrowed bluegrass...	26.7	2	9.8
Check bluegrass.....	26.7	2	12.4
Renovated bluegrass.....	26.7	2	12.5
		<u>.0217-acre plots</u>	
Timothy-lespedeza-sweet clover.....	26.4	3	10.0
Timothy-lespedeza.....	26.4	3	10.6
Wheat-lespedeza.....	26.4	3	12.3

Effect of Topsoil on Oat Yield - E. T. Kardos, Durham, New Hampshire. - "Oats on the subsoil-topsoil plots at Northwood were harvested and total yields (pounds per acre) of air dry matter are indicated in the following table as averages of duplicate plots:

<u>Per cent topsoil removed</u>	<u>Fertilized*</u>	<u>Unfertilized</u>
0	6,797	4,261
50	6,857	1,319
100	4,411	582

*Fertilizer equivalent to 100 pounds N, 400 pounds P_2O_5 and 100 pounds K_2O per acre was broadcast and then harrowed into the surface.

"The results shown even more strikingly than the greenhouse trials of last winter (see February 1945 Summary) the importance of preventing loss of topsoil. The results for the unfertilized plots showed a decrease in yield of 69 per cent when 50 per cent of the topsoil was removed and a decrease in yield of 86 per cent when 100 per cent of the topsoil was removed. The yield of the heavily fertilized subsoil was approximately eight times greater than the unfertilized subsoil and yet was not significantly greater in yield than the unfertilized plot with 0 per cent topsoil removed."

Evaluation of Factors Influencing Sorghums - H. H. Finnell, Amarillo, Texas. - "We have concluded the evaluation of those factors of which we have adequate record for study in the production of both grain and forage sorghums. I am now ready to begin the analysis of variance in preparing for the framing of a report. Factors which were found to be of independent significance to grain sorghum production were coarseness of soil texture, water conservation practices, thickness of stand, moisture supply of the preparatory period January-April positively related and slope of the land, density of weeds and excessive rainfall during the fruit and maturity period August-September negatively related. The May-June period of rainfall was found to be favorably related to grain sorghum production until a total of seven inches had been received. Excessive rainfall above this amount was unfavorable. For forage production erosion accumulation, water conservation practices, moisture supply of the preparatory period January-April, the July rainfall and thickness of stand were positively related while erosion removals, September rainfall and density of weeds were negatively related."

Summer Fallow - Hugh C. McKay, St. Anthony, Idaho. - "More rainfall has been received this summer than any previous summer since rainfall records have been kept. This has necessitated making four weeding on the summer fallow plots with one more in prospect before seeding fall wheat. Due to heavy rainfall this spring it was necessary to use the culti-hoe in front of the rod weeder to obtain a complete weed kill. Due to this operation and subsequent weeding the fallow became very firm. It was necessary to use the Calkins with shovel attachments for the last weeding in order to penetrate the soil."

Wheat Yields at Lincoln, Nebraska - F. L. Duley, Lincoln, Nebraska.-

"The small grain threshing has been completed. There was a wide range in yields on various plots and fields, but in general yields were as high as could be expected for the conditions tested in each case. A few wheat yields went above 50 bushels. There were some low nitrate conditions in spring due to the cold, wet weather. Applications of nitrate gave some increase in yield, but not as much as might have been expected from the spring condition. A brief summary of the mean yields obtained on different treatments is given in the following table:

"Yields of small grain on plowed and subtilled land, bushels per acre, Lincoln, Nebraska, 1945

Treatment	Wheat		Oats	
	Plowed	Subtilled	Plowed	Subtilled
Rotation plots.....	40.3	39.7	49.9	50.2
Wakelin Field				
With nitrogen fertilizer.....	50.3	50.4		
Without nitrogen fertilizer.....	45.7	46.5		
With manure.....	48.2	47.8		
Without manure.....	45.9	43.0		
Gillen Field				
2-subtillages only.....		37.3		
2-subtillages + plowing.....	40.2			
3-subtillages.....		38.9		
2-subtillages + nitrogen.....		44.3		
2-subtillages + plowing + nitrogen.....	47.3			
3-subtillages + nitrogen.....		43.9		
Hastings Project				
Fallow.....	42.4*	29.4		
	22.4	29.0		
Wheat after oats.....	16.5	17.6		
Miscellaneous plots, Lincoln				
Field 26-III - after corn.....			45.0	38.0
Field 26-III - with nitrogen....			52.7	54.3
Kenny Field - manure 1945.....			50.3	45.8
Kenny Field - no manure 1945...			38.7	31.9
Kenny Field - manured 1944.....			33.9	33.4
Kenny Field - no manure 1944...			28.9	28.6
Mean, all tests.....	39.9	39.0	42.8	40.3

*Basin listed instead of plowing. This plot higher fertility than the subtilled plot.

"In most cases, as well as in the mean yield of all plots, the difference due to plowing or subtilling could not be considered significant."

Pasture Tillage Trials - R. M. Smith, Morgantown, West Virginia.-
 "Summarizing pasture tillage trials to date we have the following results:

Item	Dry weight yield	Bare space, per cent	Desirable species, per cent	Legumes, per cent
First year (seeding year) - 10 trials				
Plowed, treated, seeded.....	1,527	60	40	10
Shallow tilled, treated, seeded.....	2,081	47	34	16
Surface treated.....	1,477	54	9	6
No treatment.....	1,210	56	3	1
Second year - 10 trials				
Plowed.....	2,064	51	46	14
Shallow tilled.....	2,144	41	44	21
Surface treated.....	1,315	51	18	9
No treatment.....	809	55	7	2
Third year (incomplete results) - 3 trials				
Plowed.....	1,726	56	40	5
Shallow tilled.....	1,560	51	37	8
Surface treated.....	1,698	51	30	6
No treatment.....	1,044	70	6	Trace

"These data are supported by other estimates and experiences throughout various parts of the State and support the conclusion that tillage and re-seeding, where carried out correctly, gives a rapid and marked improvement of poor pastures, especially with respect to quality, although some increase in dry weight yield can ordinarily be expected as well.

Subsoil Siltpan Horizons.-"Summarizing our data for subsoil siltpan horizons, it seems clear that this designation applies to a strongly-leached lower subsoil layer of intermediate texture, grossly-massive structure, high volume weight, low exchangeable bases and low organic matter. Two of the most consistent chemical characteristics are pH values close to 5.0 (the extreme range is 4.3 to 5.2), and approximately 2.0 per cent of the exchange capacity occupied by potassium. The range of potash saturation is quite small and suggests that this may be a good index of the degree of leaching. Dispersion studies show conclusively that there is no significant cementation of soil grains as in real 'hardpan' soil horizons. Simple shakings in water invariably destroy all aggregates larger than about 0.5 mm. in diameter. This accounts for the exceptionally high erodibility of siltpan horizons when exposed at the surface."

Alfalfa-Brome Yields - C. A. Van Doren, Urbana, Illinois.-"Two cuttings of alfalfa-brome have been harvested from seedings made in the fall of 1944 on the trash-mulch plots. Plots were established on land previously untreated. Treatment consisted of application of limestone and superphosphate. The seedbed on one plot was prepared by discing and on another by plowing. Brome sedge was not completely obliterated on the disced plot. The yields are:

"Effect of seedbed preparation on yield of alfalfa-brome

	<u>First cutting</u>	<u>Second cutting</u>	<u>Total</u>
Disced	3,074 lbs./A	2,039 lbs./A	5,113 lbs./A
Plowed	4,138 lbs./A	2,671 lbs./A /	6,809 lbs./A

"Additional seedings of alfalfa-brome were made on August 25. The plowed plot was double disced four times after plowing. The disced plot was double disced six times. Preparation of the seedbed was started earlier than in 1944. Brome sedge was more completely killed on the disced plot."

Lehmanns Lovegrass - Joel E. Fletcher, Tucson, Arizona.-"Lehmanns lovegrass became established at the Parker Ranch plot on less than an inch of effective rainfall. Grass at other experimental plots had made more than satisfactory growth, with some areas far exceeding even wishful expectations.

"In the San Francisco Peaks area, measurements were made on the bearing pressure change following just one cultivation with the soil at near field capacity. Values were raised as much as double by just one operation.

"Root distribution of Pinto bean plants was roughly traced in a soil previously worked while wet and the roots were found to follow the compacted area parallel with the ground surface, instead of penetrating in a normal manner."

Pasture and Animal Gains - Harley A. Daniel, Guthrie, Oklahoma.-

"The steers on the pastures at the Guthrie Station were removed. The amount of beef produced during the grazing period (April 21 to August 21) on the different pastures is as follows:

Kind of pasture and land	Pounds of gain	
	Daily	Per acre
Cleared virgin.....	1.9	58.7
Regrassed eroded.....	1.8	36.8
Regrassed cultivated.....	1.9	39.2

"May was extremely dry and June abnormally wet which made an unusual grazing season."

Fish Growth at the Arnot - John Lamb, Jr., Ithaca, New York.-

"Blue gills and black bass placed in the Arnot pond last of June are now 3 to 4 inches and 6 to 7 inches long, respectively. Fingerlings at the time of stocking were less than an inch long. The pond has been fertilized 5 times at the rate of 100 pounds per acre of 8-8-4. The water is quite murky as a result of the fish food growth, and a light colored object disappears at a depth of approximately 15 inches. Twelve-inch disappearance would be better, but the fish have shown splendid growth in the two months. Where the bank slope is less than 2 to 1, there is considerable marginal-weed growth which is undesirable.

Turn-Plowed and Trashy-Surface Buckwheat Plots.-"A definite difference in growth can be seen this year at the Arnot in comparing the turn-plowed buckwheat plots with the trashy-surface buckwheat plots. Throughout the summer the turn-plowed plots have been nearly double the height of the trashy plots. However, as usual, runoff and soil loss have been 2 to 4 times greater on the turn-plowed plots."

DRAINAGE AND WATER CONTROL DIVISION-

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"The lowest August rainfall since the establishment of this station was recorded during the month totaling only 1-1/2 inches. Rain fell on 5 days, the largest amount in a single day being 0.35 inch on August 1.

"Soil moisture in the corn areas (0- to 14-inch depth) on August 25 reached a low of 7 percent. Although the corn is still green over most of the area, the soil moisture is quite close to the wilting point. The corn on the lysimeters showed wilting about August 20. After this date the rate of evapo-transpiration reduced materially.

"It is interesting to note that soil moisture at the end of June was about 18 to 20 percent. With rainfall for July of 2-1/2 inches and corn evapo-transpiration of 6 inches for the month, a net decrease in soil moisture of 3-1/2 inches occurred. Then for August, when 1 inch of rain fell, the normal evapo-transpiration would have been 5 inches if there had been adequate soil moisture to supply the 4-inch deficit. Lysimeter records show that the evapo-transpiration was 4 inches with the reduction in rate of water use taking place after August 20.

"It is also interesting to note that evapo-transpiration for July 1945 was about the same as that for July 1941. In the 1945 period 2-1/2 inches of rain fell whereas, in the 1941 period, 6 inches of rain fell.

"Although the soil moisture and ground-water quantities in March and April of this year were almost at their peak for a period of several years, deficient rainfall for July and August has resulted in the drying up of springs and several of the streams at the gaging stations. Construction of the V-notch weir at station 11 was completed. Check current meter measurements will be made at this station during flood flows.

"Strips were laid out on watershed 185 after hay harvest. This 7-acre watershed is being converted from single cover to strip cropping to alternate with watershed 187. A summer seeding to alfalfa-grass mixture was made on alternate strips by the trash mulch method.

Hydrologic Studies - I. W. Bauer, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"The precipitation at the meteorological station was 1.44 inches, which is considerably below the normal of 2.96 inches. The rain fell in small showers; the largest was .57 inch.

"The corn is suffering considerably, especially the fields that are weedy.

"The plowing for wheat was done during the month but the seedbed can not be prepared until moisture conditions are improved.

"The following table shows the average rainfall runoff and total yields from the plots from January to August 3:"

	Straight Rows	Contoured	Subtilled ²	¹
OATS				
Rainfall inches	15.44	15.62	15.48	15.90
Runoff inches	2.794	2.260	2.407	2.193
Percent	18.1	14.5	15.5	13.8
Yield - Bu./Acre	24.4	30.1	25.8	21.1
WHEAT				
Rainfall inches	15.46	15.87	16.01	
Runoff inches	.914	1.432	1.123	
Percent	5.9	9.0	7.0	
Yield - Bu./Acre	12.4	13.8	12.2	
CORN				
Rainfall inches	15.74	15.98	15.48	16.15 ³
Runoff inches	1.490	1.246	1.554	2.370
Percent	9.5	7.8	10.0	14.6

1/ Changed from strip to sub tillage in March; average of two plots.

2/ One plot severely damaged by hail.

3/ Changed from strip crop to sub tillage in April; only 1 plot.

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana. - "A heavy rainfall of very unusual intensities fell at the Throckmorton farm on August 14. Totals from 8 gages varied between 2.17 to 2.57 inches in one storm over a period of 1 hour and 35 minutes (includes a lapse of 25 minutes). Maximum average intensities for a 10-minute interval (approximate concentration time of watersheds) ranged between 5.40 and 6.80 inches per hour, the latter exceeding the 100-year probability of frequency as determined by Yarnell.

"The following table shows amounts and rates of runoff and some relationships to rainfall for the experimental watersheds under different crops and management practices:

Rainfall and Runoff from Small Watersheds in
Corn, Meadow and Grain Stubble, under
'Prevailing' Practices and Conservation Treatment
Purdue-Throckmorton Farm, Lafayette, Indiana - August 14, 1945

Crop	Treatment	Rainfall			Runoff		
		Wsd. No.	Total (in) ²	Max. 10 min. rate (in/hr.)	Peak rate (in/hr.)	Total In.	%
Corn	Prev. practice	10	2.17	5.40	2.98	0.96	44
		15	2.49	6.80	4.88	0.94	38
	Cons. practice	18	2.32	5.60	0.11	0.02	1
		14	2.49	6.80	0.56	0.09	4
Wheat stubble w/meadow seeding	Prev. practice	4	2.57	6.70	1.91	0.40	16
		12	2.17	5.40	0.49	0.20	9
	Cons. practice	2	2.57	6.70	0.45	0.07	3
		11	2.17	5.40	0.14	0.05	2
Grass-legume meadow	Prev. practice	5	2.40	6.06	0.96	0.34	14
		8	2.25	5.70	1.62	0.36	16
	Cons. practice	6	2.40	6.06	0.14	0.04	2
		7	2.25	5.70	0.79	0.16	7

¹ Corn, wheat, meadow rotation, 'square' tillage, and seeding, common (light) fertilization of corn and wheat on 'prevailing' practice watersheds; same rotation, contour seeding, heavy fertilizer application and manure plowed under for corn, heavy fertilization and manure top dressing of wheat on conservation treated watersheds; in second rotation under differentiated treatment.

² Record of nearest gage, not adjusted for areal distribution.

³ Wheat combined on July 24, straw left on ground.

⁴ Hay cut July 7, 1945

"Runoff control on the conservation-treated-corn watersheds was practically complete for this storm, being equally as effective as the control on those in wheat stubble with new meadow seedings (straw scattered on the ground), and more effective than that on the meadow watersheds. Control on the corn watersheds was more effective for this storm than for earlier storms this season and much more effective than for a similar heavy rainfall, but with appreciably lower intensities, which occurred on July 20, 1942, when the same watersheds were previously in corn, in their first season of differential treatment.

"Analysis of runoff samples for the August 14 storm are not all completed. Mr. Bedell reports the following losses of total solids, organic matter and nitrogen, which are revealing:

Soil, Organic Matter and Nitrogen Losses from
Corn, Wheat Stubble with Seeding and Old Meadow, on
'Prevailing' Practice and Conservation Treated
Watersheds
August 14, 1945

Crop	Treatment	Wsd. No.	Soil & Fertility Losses, lbs. per acre		
			Total solids	Organic matter	Nitrogen
Corn	Prev. practice	10	1396	63.2	3.40
		15	1799	77.6	3.94
	Cons. practice	18	4	0.4	0.02
		14	48	2.6	0.14
2:					
Wheat stubble w/meadow seeding	Prev. practice	4	7	2.2	0.05
		12	3	1.1	0.03
	Cons. practice	2	2	0.4	0.02
		11	1	0.4	0.02
3:					
Grass-legume meadow	Prev. practice	5	3	1.3	0.06
		8	9	1.9	0.09
	Cons. practice	6	1	0.3	0.02
		7	5	1.0	0.08

(1), (2), (3), --See footnotes, 1, 3 and 4, respectively, following previous table.

"It may be noted that losses of soil, organic matter, and nitrogen from corn on the 'prevailing' practice watersheds were substantial for a single storm; whereas these losses from corn on the conservation-treated watersheds were very low. Data in a subsequent table and previously reported show much lower amounts of crop residues of lower nutrient values being returned to the soil under the 'prevailing' treatment than under the conservation treatment, making the difference in their organic matter losses of added importance.

"Grain yields from wheat watersheds were included in the July report. The following table shows comparison of straw yields under the 'prevailing' practice and conservation treatments:"

1945 Wheat Straw Yields, Experimental Watersheds			
Treatment	: Wsd. No.:	Yield, lbs. per acre	²
Prev. practice:	4	:	4557
	12	:	4877
	Average	:	4717
Cons. practice:	2	:	6966
	11	:	7326
	Average	:	7146

¹ See footnote 1, following previous tables.

² Air-dry weights.

Hydrologic Studies - R. G. White, East Lansing, Michigan.-

"There were 3 periods of runoff at the cultivated watersheds and 1 period of runoff at the wooded watershed. There was no measurable soil loss at any of the watersheds, but runoff water at the cultivated watersheds was slightly cloudy. Runoff figures for the month are shown in the following table:

Date	Cultivated Watersheds			Wooded Watersheds	
	Rainfall:	Runoff		Rainfall	Runoff
		"A"	"B"		
Aug. 6	1.07	0.0040	0.0099	1.21	0
Aug. 29	0.94	.0023	.0096	0.32	0
Aug. 31 ^{1/}	1.05	.0022	.0076	1.31	.0007
Total for Month	5.02	.0085	.0271	4.95	.0007

^{1/} Storm extended past midnight.

"Rainfall intensity for the storm of August 29 reached a maximum of 6.60 inches per hour for a 2-minute period. During the first 9 minutes, 0.59 inch of rain fell for an average intensity of 3.93 inches per hour and the total duration of the storm was 94 minutes.

"While the runoff at the wooded watershed can scarcely be considered as more than a 'trace', it is interesting to note that this is only the second period of runoff for that watershed during 1945. In fact, it is the second period of runoff since May 1944.

"Two requests for soil temperature data were received by the Soils Department during the month and the data was supplied from project records. One request was from the Dow Chemical Company and the other from the Ohio Oil Company."

Hydrologic Studies - John Lamb, Jr., Ithaca, New York.-"Only 6 storms over the watershed areas were recorded during the period. With the exception of the August 31 storm, all were of low intensity. Evapo-transpiration was high, leaving the areas very receptive, with resulting little or no runoff. The storm path of August 31, centering over No. 5, 9-acre woodland watershed, had a total of 1.56 inches falling in 1 hour, with a maximum intensity of 0.50 inch in 10 minutes. Peak CFS was 0.0496 while total runoff for the storm was only 0.0036 inch, or 0.23 percent of total rainfall.

"Two miles away, in idle land in weeds, this same storm amounted to 0.42 inch, and lasted only 35 minutes with just a 'trace' of runoff."

Microbiological Studies - F. L. Duley, Lincoln, Nebraska.-"Samples taken from a number of places indicate that where there is considerable residue on the surface there is a distinct increase in the numbers of fungi, actinomycetes, and bacteria in the surface inch. As the residue becomes dissipated the difference largely disappears.

"Comparisons are being made on the rates at which different fungi break down straw. Certain ones appear to be much more efficient than others. Measurements of ammonia loss from different types of residue indicate very little if any loss at this season of the year."

Runoff Studies - V. D. Young, Fayetteville, Arkansas.-"The mean rainfall for the month of August on the Bentonville Watersheds was 3.46 inches.

"A tabulation of peak rates of runoff occurring from the watersheds located near Bentonville, Ark., Muskogee, Okla., and Garland, Tex. for the months of June, July, and August shows that the higher rates occurred from the Muskogee watersheds located on Claypan-Prairie soils and from the Garland watersheds located on Texas Blackland soils. Those watersheds having cultivated crops had higher rates than those in mixed crops, meadow, pasture, or woods for a given group on similar soils.

"The top half of one of the Bentonville pastured watersheds was plowed this spring and planted to corn approximately June 2. This treatment has increased both the rate and amount of runoff."

Runoff Studies - H. K. Rouse, Colorado Springs, Colorado.-"Precipitation during August was heavy, averaging 5.12 inches compared with the 7-year project average of 2.30 inches. Precipitation for the first 8 months has ranged from 15.89 inches to 17.06 inches,

compared with the 7-year project averages of 9.36 inches to 11.45 inches. The 2-month totals for July and August are 11.96 inches, 12.69 inches, 12.26 inches, and 9.81 inches for Watershed W-I, W-II, W-III and W-IV, respectively. This is record-breaking precipitation as the maximum July plus August precipitation at Colorado Springs, in 67 years of record, was 9.84 inches.

"No extremely large daily amounts of precipitation were recorded, the maximum daily amount being 1.42 inches. Measurable precipitation occurred on one or more watersheds on 19 days during August. Intensities breaking project records for short periods were recorded on several watersheds, the most noteworthy being the following:

On August 13 at Station R-5 on watershed W-IV (Ayer)

5 minutes	0.59"
10 minutes	0.91"
15 minutes	1.00"
30 minutes	1.07"

On August 5 at Station R-4 on Watershed W-III (Blaney)

5 minutes	0.57"
10 minutes	0.78"
15 minutes	0.97"
30 minutes	1.27"

"This heavy precipitation produced considerable runoff with six runoff periods being recorded on each watershed. One new maximum rate was recorded on Watershed W-II (Lebsch), (sandy loam with native pasture cover) on August 5. The maximum rate of 1.12 inches per hour compares with 0.86 inch per hour recorded on July 10 of this year and a previous maximum of 0.30 inch per hour during the period 1938 to 1944, inclusive. Runoff periods with maximum rates only slightly lower than previously recorded highs occurred on all other watersheds."

Runoff Studies - T. W. Edminster, Blacksburg, Virginia.-

"On August 24 D. B. Krimgold visited the project. Plans were made for the immediate analysis of all Blacksburg hydrologic records for use in preparing a technical report on the runoff characteristics of the ridges and valley regions of Region I and II. Data from several cooperative TVA watersheds will also be studied. Some time was spent on a preliminary examination of the data. Methods of analysis and arrangement of these data were discussed."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.-

"The rectangular spillway-outlet tests were continued by Mr. Donnelly. He is conducting tests to determine the best height of longitudinal and end sills. A marked effect of the position of the wing-wall on the scour pattern was discovered. The data have not yet been analyzed, and results to date are therefore not yet available."

"Mr. Anderson completed the tests on the automatic drainage gate described in our June report. The last tests were made by laying the gate flat and loading it with sand. When tested with water, we could not see what was happening through the leakage and spray. With the sand loading the gate deflections could be easily observed and measured. A report by Mr. Anderson entitled 'Report on Tests of an Automatic Drainage Gate' was written early in August. This report was submitted September 7."

Hydraulic Studies - V. J. Palmer, Stillwater, Oklahoma. - "A paper entitled 'Retardance Coefficients for Low Flow in Channels Lined with Vegetation' was approved for publication in the Transactions of the American Geophysical Union. The results of studies of the flow of water through different grasses and legumes are presented. The paper is concerned with low flows which are defined as those coursing through a vegetal cover without completely inundating the plants. The retardance to flow is expressed in Manning's n . The relation of n with depth and velocity of flow, since these effect the position and behavior of the vegetation, is presented. The general tendency is for n to increase as depth and velocity increase up to and somewhat beyond the point where excessive bending and complete inundation of the plants first occur. The highest n values (except for very shallow flows through a dense surface mulch) generally occur when the vegetation is partially bent over and is oscillating in the flow. At this point Manning's n for a dense, uniform cover of medium length Bermuda grass was 0.41. For tall, good covers of weeping lovegrass, blue grama grass, native grass mixture, alfalfa, and lespedeza sericea, n , varied little between covers, being in the range of .20 and .26."

Hydraulic Studies - D. D. Smith, McCredie, Missouri. - "A quarter mile of No. 4 ditch of the Little River Drainage District in Cape Girardeau County, Missouri, was sprayed with Weedone to kill willows and other vegetation which infests the ditch banks. If this growth is not removed, a serious reduction in flow capacity of the ditch occurs. Hand clearing every other year at a cost of about \$100 per mile is the present practice. Two gallons of Weedone was used in the quarter mile trial spraying. The mix rate and rate of spraying were varied for different lengths of the trial section.

"An article entitled 'Tile Lines for the Auxiliary Protection of Vegetated Terrace Outlets' was prepared and submitted for publication approval. This article based on Bethany data shows that removal of all runoff from a terraced area, which occurs at 0.1 inch per hour or less will remove 42 percent of the total runoff and reduce the time of runoff by 93 percent. Field trial installations based on these data are planned."

Hydraulic Studies - A. W. Marsh, Corvallis, Oregon.-"The fourth and final irrigation was applied to all plots on the Malheur Experiment Station. During the season considerable deposition of soil has occurred in the furrows at and below the point where the slope decreases. This material had been eroded from the furrows above where the slope was steeper and where naturally the irrigating stream was larger. This demonstrates the inevitability of erosion on fields of non-uniform slope even though careful control is exercised and the total soil removal from the field is very small. The high percentage of sodium in this soil, of course, makes it more erodible than a normal soil."

Hydraulic Studies - Stephen J. Mech, Prosser, Washington.-"All plots were irrigated at least once during the month. A total of 1,088 soil-moisture samples were taken in connection with the 34-plot irrigations made during the month. The potato plots were dug on August 18-20.

"The yield for the different plots with the same treatment varied so greatly that no definite effect can be attributed to the rate of application. There was however, a definite reduction in yield on the lower part of the downhill plots. The contour plots again showed good uniformity. That this reduction in yield at the lower half of the plot is involved somehow with the silt in the furrow stream is indicated by the comparison of the yield on the adjacent alfalfa plots. On the alfalfa the yield even on the downhill plots is quite uniform.

1945 POTATO PLOTS (Total Yield in Tons/Acre)

Rate of application ^{1/}	Approximate: Contour 2% grade			Downhill (7% grade)			
	inches	Upper half	Lower half	Entire plot	Upper half	Lower half	Entire plot
q	33	10.1	9.1	9.6	10.1	7.7	8.9
2q	66	9.3	9.3	9.3	9.4	6.9	8.1
3q	99	10.3	10.1	10.2	12.5	9.1	10.8
Total Average		9.9	9.5	9.7	10.6	7.9	9.3

^{1/} The duration of irrigations was the same for all three rates.

1945 ALFALFA YIELD (First and Second cutting in T/A)

		Contour (2% grade)			Downhill (7% grade)		
		Upper	Lower	Entire	Upper	Lower	Entire
Treatment:	Min. Av. M.: half	half	half	plot	half	half	plot
Wet	60%	4.10	4.33	4.21	4.64	4.66	4.65
Medium	35%	3.72	3.99	3.85	4.47	4.40	4.44
Dry	15%	4.36	4.42	4.39	3.93	3.96	3.94
	Average	4.06	4.25	4.15	4.35	4.34	4.34

"The different plots were irrigated only when the soil moisture dropped to 60, 35, and 15 percent of Available Moisture. Enough water added to raise it to F. C."

Hydraulic Studies - Vito L. Vanoni, California Institute of Technology, Pasadena, California.-"Tests were completed on the model of the existing Lower Caney Lake spillway modified according to Plan II proposed by the Fort Worth Office. The existing spillway has a curved crest 250 feet long, and the spillway is contracted to a width of 84 feet, in a distance of 220 feet by vertical walls curved in plan. Tests on this same structure made in 1943 are covered by Report TR-64, CF-R-1. In these tests a design flood of 6,000 cfs was used. The re-valuation of the hydrology of the watershed indicates that the design flood should be 7,550 cfs. Plan II is designed for this higher discharge. The tests made in 1943 proposed a modification of the structure that would give a spillway 404 feet in length. Plan II proposes a structure 354 feet in length. The tests made this month with a higher design discharge show that the hydraulic performance of the structure is not satisfactory. The extremely rapid contraction of the side walls caused the water to concentrate near the sides and did not permit a stable uniform hydraulic jump to form in the stilling basin. This causes poor energy dissipation and excessive bottom and side scour in the channel downstream. Although it may be possible to modify the structure to give satisfactory performance, an economic analysis shows a new and more reliable structure can be built for approximately the same cost. This is true because so much of the existing structure is defective and must be replaced. A preliminary memorandum report covering the results of the tests was forwarded to the Fort Worth Office. Good progress was made in testing a model of Plan III for the Lake Carl Blackwell spillway proposed by the Fort Worth Office."

Sedimentation Studies - Carl B. Brown, Washington, D. C.-"Computations were completed on rates of storage loss in 18 representative stock ponds in the Land Utilization Project near Pierre, South Dakota. The original storage capacities of these ponds ranged from 2.7 to 44 acre-feet. They were built in 1936 to 1938. Annual rates of silting were found to vary between 0.93 percent and 5.62 percent. The average rate of storage loss for the 18 ponds was

1.97 percent. Analysis of rates of silting in relation to watershed characteristics will be made when aerial photographs covering the project are received.

"At the request of local interests, a partial reconnaissance survey was made at Cranbury Lake, Cranbury, New Jersey to determine the extent of silting and methods of silting control. In the lower part of the Lake, which is used for recreational purposes, it was estimated that at least 27 percent of the original capacity had been lost. In order to provide a uniform average depth of 10 feet in this part of the lake, with shores sloped 1:1, 81,000 cubic yards of material would have to be dredged. Recommendations for future protection of the lake included: (1) Planting of additional aquatic vegetation in the upper part of the lake, which is almost completely silted, to provide a more effective vegetative screen. (2) Do not drain the swampy and densely vegetated main stream valley for a distance of several miles above the lake. (3) Establish conservation practices on the slopes immediately above the lower portion of the lake and develop a vegetative-buffer strip between the lake shore and the slopes to screen out and cause deposition of the erosional debris. This buffer strip could be made attractive by proper landscaping and use of ornamental scrubs and plants."

"An article was prepared by Mr. Brown entitled 'Protect Water Supplies in the South by Soil Conservation', for Southern City, a municipal magazine published at Raleigh, North Carolina."

Drainage Studies - R. E. Morris, North Liberty, Indiana.-

"The row peppermint on the drainage plots was harvested August 10 and the yields are given below. The yields are fairly well correlated between like plots with the exception of plots 2 and 7, variable plots, in which wide variance occurs. No explanation for this variation can be given at this time:"

Plot No.:	Water. Table : Depth : Inches	Area : Acres :	Gross yield : Pounds :	Yield Lbs. per acre
1	45	0.064	3.31	51.7
8	45	.064	2.94	45.9
				Av. 48.8 @ \$5 = \$244
2	Var. 40-24	.066	3.56	53.9
7	do	.066	2.38	36.1
				Av. 35.0 = \$225
3	30	.066	2.75	41.7
6	30	.065	2.50	38.5
				Av. 40.1 = \$200
4	15	.066	.62	9.4
5	15	.066	.75	11.4
				Av. 10.4 = \$ 52

Drainage Studies - Ellis G. Diseker, Raleigh, North Carolina.-

"A rather extensive survey was made in seventeen counties in the north-eastern part of the State. This survey included a study of existing tile and open ditch installations and the need for drainage on the undrained areas. This study was made in cooperation with the Office of Operations, the North Carolina Extension Service, and cooperating farmers.

"Thousands of acres of land has been drained in this state by tile and small field ditches. Some of the tile installations are fifty years old. The majority of the ditches were constructed with vertical sides, and were established during the slavery period. About 95 percent of the tile used is of 4-inch diameter, conforming to the natural systems in which case the main line follows a draw, with occasional laterals. Only in a few instances has the tile failed to function satisfactorily and that is where it was laid in some of the more plastic subsoils or where the outlets became plugged due to neglect and improper installation. On the majority of the extremely flat, wet areas, tile installations are not very prevalent. Fair to unsatisfactory drainage in these flat areas is accomplished by a series of small, open ditches spaced about 150 to 300 feet apart. In the early days a small quantity of concrete tile was installed which was decomposed in a few years by the action of the acid soils. There was no apparent harmful reaction of the acid soils on the clay tile.

"The Office of Operations is installing a great quantity of tile, mostly of 4-inch diameter, on the light-textured soils in this state. A common practice is to replace old open ditches with tile. Many of the ditches failed to give satisfactory drainage but the areas are now adequately drained by tile.

"The Service is handicapped by the lack of information for drainage of the plastic and semi-plastic soils in that the general information on spacing and depth of installation is not adaptable to these two soil groups. Both the farmers and the Soil Conservation Service personnel are very eager for information whereby better drainage can be accomplished. Likewise, they have been extremely cooperative during the survey and are requesting information especially for tile installations.

"During the survey five tentative locations were selected for drainage installations.

"A small amount of time has been devoted to the Hoffman Forest area, which is a corporation owned and operated by the North Carolina State College. This area consists of 82,000 acres, mostly in timber, and is located in a large pocosin in Jones and Onslow counties. It is operated by Dr. J. V. Hoffman, Head of the Department of Forestry, State College. The most of this forest is very poorly drained. A

complete weather station is located in the area and numerous wells for determining water-table levels are in the process of being installed by the Forestry Division of North Carolina State College. Data collected here will be available to the Agricultural Engineering Department for the Research Drainage Project. A tentative location for a stream-gaging station has been selected in the edge of the forest on the White Oak River. This river heads up in the forest and drains up to about 70,000 acres. This station can be operated by the employees of the Forest Service, located within 1/2 mile of the river.

"Dr. Hoffman is initiating a drainage project which will consist of about 50 miles of open ditches and canals. All ditches will be constructed by the use of dynamite and will also serve as fire breaks. Dr. Hoffman desired information on the use of dynamite for this job and how to load for the different ditch cross sections. Due to the scarcity and the high cost of labor he also wanted to know if it would be practical to shoot the ditches through before clearing the right of way. I used 1,700 pounds of ditching dynamite for test shots under various conditions, and in addition to test shots about 3,000 feet of ditches were blasted. The dimension of the ditches ranged from 6 to 16 feet top width and at a depth of 2.5 to 6 feet. A considerable amount of pine, gum, and maple trees were in the ditch line before shooting. These trees ranged in size up to 2.5 feet in diameter. All debris was thrown clear of the ditch, except an occasional tree about every 60 linear feet would fall back across the ditch. A tractor equipped with bulldozer and cable was available for getting these fallen trees from over the ditch line. No additional charge of explosive was used for removing small trees on the large ditches. Two to four pounds of additional explosives were used on the large trees. All shooting was by the propagation method.

"The dynamite cost 13.5 cents per pound and the cost of moving a cubic yard of soil ranged from 8.3 cents to 15.0 cents for explosive cost only. With labor at 50 cents per hour, the total cost ranged from 9.6 cents to 19.6 cents per cubic yard of soil moved. An additional explosive cost of not over 12 percent required for moving large trees on the ditch line can be added. The cost of 16.0 cents per cubic yard occurred where a ditch passed through a sand ridge which was relatively dry and required close spacing of dynamite charges for propagation. The remainder of the shooting was in wet, marshy soil with the water table on the ground surface and occasionally 2 feet above the ground surface. The most of the ditches will be in the wet, marshy soil. Under the conditions it was concluded that it was most practical to shoot the ditch and then clear the fallen trees off the ditch, and that it was the fastest and most economical means of ditching. Another ton of dynamite was ordered by the Forest Service and they are shooting ditches this week. Dr. Hoffman stated that 25,000 acres of the forest area will be brought into full timber production by drainage and that the remaining 57,000 acres will be greatly benefited. Likewise, other similar large areas in this state can be greatly benefited by drainage."

IRRIGATION DIVISION

Snow Surveys and Irrigation Water-Supply Forecasts -

Wayne D. Criddle reports.-"In 1941 a snow-survey shelter cabin was built near the Bluebird Basin Snow Course in Kootenai National Forest of Montana. Our Division supplied the materials and all labor was donated by the employees of the Forest Service. The construction of this cabin is unique in that it is a two-story affair. The cabin proper is built on stilts about 12 feet above the ground, and the bottom is all enclosed and used for storage of wood and non-perishable food. Mr. Work was very much impressed with the design of this cabin, so the district forest ranger who makes the snow surveys at the Bluebird Basin Course has been asked to prepare a paper on the design of this shelter, to be presented at the next snow-survey conference."

R. L. Parshall reports.-"I have given further attention to the study of the relation of all and the succeeding summer runoff for the Animas River in southwestern Colorado. My efforts have been fruitful in finally developing a method whereby for this particular stream it seems that over the 18 consecutive years 1927-44, inclusive, only 2 show a deviation in the computed forecast of more than 25 percent. These years were 1934 and 1938. On this basis the forecasts were reasonably close for about 90 percent of the total years included in the study."

Storage of Water Underground for Irrigation - San Joaquin Valley, California Cooperative Investigation - Fred C. Scobey reports.-
"Preparatory to the meeting of the Committee on Water Spreading in San Joaquin Valley, all tabulation, graphs, and reports on individual ponds were brought up to date, printed in quantity and sent to the contributing agencies."

Silt Load of Texas Streams - Emptying of Lake Austin -
Mr. Bloodgood reports.-"On August 6 the Lower Colorado River Authority emptied Lake Austin for the purpose of drying the benches adjacent to the original stream channel. These benches had a considerable aquatic growth on them - mostly a variety of duck grass that had been planted for duck food. This growth was so dense that recreational uses were hindered. The growth also extended below the lake and beyond our silt station at Montopolis Bridge. Here, it obstructed the river flow to such an extent that the water levels were raised nearly 2 feet. The main idea of emptying the lake was to permit the sun's rays to come in contact with the vegetative growth and possibly kill or destroy a large portion of it. The Authority turned loose large quantities of water through the gates of the dam and there was a possibility these waters might carry with them some silt. We obtained a sample of water below Austin Dam and at Montopolis Bridge before there was any abnormal flow in the river; then at 2-hour intervals, samples were obtained at both places. Since the first 24-hour period at Austin Dam, the water samples have been obtained twice a day and will continue to be

taken until the lake is filled again. Most of the samples showed little silt passed the Austin Dam, but at Montopolis Bridge and during the first day or 24-hour period, there was considerable silt which had been picked up between dam and bridge, a distance of about 4 miles. I discontinued the taking of special twice-daily water samples for silt determinations at Austin Dam on the 17th. The water passing the dam was clear and contained very little silt. The Lower Colorado River Authority planned to refill the lake early the following week."

Discussion of screened evaporation pan - Mr. Young reports.-

"A condensed copy of my paper on the screened pan was received from Adolph Meyer, Committee Chairman, and copies were sent to the Berkeley office. The revision amounted to about 60 percent. I completed a second draft of the discussion on the Screened Evaporation Pan, for the Hydrology Manual being prepared by the American Society of Civil Engineers. It included a summary table of evaporation from the screened and the Weather Bureau pans at both Fullerton and Elsinore, including monthly and annual coefficients. If this table is published in a manual it will amount to an acceptance of the coefficients of 0.77 for the Weather Bureau pan and of 0.98 for the screened pan for climates similar to southern California. In preparing the tabulation it was desirable to fill in a few gaps caused by missing records. I have devised a method by which this can be done by plotting the product of mean air temperature and the percentage of daytime hours against monthly evaporation. With mean monthly temperatures known for the month of missing record it is possible to obtain reasonably accurate data from the diagram. I have used this method in connection with several types of evaporation pans with satisfactory results."

Seepage Losses Affecting Irrigation Practices - Carl Rohwer reports.-"Mr. E. W. Lane of the Bureau of Reclamation brought 25 Chinese, Indian, and South American engineers to Fort Collins to inspect our laboratories and become acquainted with the work we are doing here. The engineers from India were particularly interested in our seepage work and the experimental canal-lining project. I was interested to learn that brick canal linings, which I discussed briefly in my recently completed seepage report, are used extensively in India. The engineers pointed out also that they favored lean concrete because it did not crack so badly as rich concrete. This is probably true, but I still think that you have to have a dense concrete if you want to make it water-tight."

Irrigation Requirements - St. Anthony, Idaho.-J. C. Marr and Wayne D. Criddle spent a week at St. Anthony, Idaho, making irrigation tests for basing recommendations on lengths of run and irrigation heads for the Yellowstone Soil Conservation District. Interesting data were procured which it is believed will go a long way in determining the irrigation requirements for the area. Irrigation tests were conducted on five separate farms in the district. The

following factors were measured: (1) The rate of infiltration of water into the soil; (2) time rate of advance of water down the furrows; (3) the size of irrigation stream used in each furrow; (4) the amount of surface waste water under present irrigation practices; (5) the time required by the farmer to irrigate the crops; (6) the soil moisture before and after irrigation; (7) the field capacity of the soil. A preliminary report will be prepared from these data to assist the technicians of the district in setting up the farm irrigation systems."

Compilation of Federal Census Data on Value of Principal Irrigated Crops in the Seventeen Western States:-Paul A. Ewing completed a compilation based on 1940 Federal Census data, to show the value of principal irrigated crops in the 17 Western States as of 1939. This extends the compilation previously made by Mr. Ewing for the 11 Mountain and Pacific States, which appeared U.S.D.A. Circular No. 678, "Design and Operation of Small Irrigation Pumping Plants" in Table 1. The Census publications did not show these or corresponding totals, and the compilation was attempted to meet calls for this information which have been frequent. The list for the 17 States follows:

	<u>Value of</u> <u>irrigated</u> <u>crops, 1939</u>		<u>Value of</u> <u>irrigated</u> <u>crops, 1939</u>
Arizona	\$22,334,000	North Dakota	\$503,000
California	280,120,000	Oklahoma	122,000
Colorado	46,927,000	Oregon	19,302,000
Idaho	43,970,000	South Dakota	924,000
Kansas	3,316,000	Texas	36,470,000
Montana	18,882,000	Utah	12,037,000
Nebraska	12,866,000	Washington	36,382,000
Nevada	4,885,000	Wyoming	14,531,000
New Mexico	13,223,000		
	Total	\$573,794,000	